

REMARKS/ARGUMENTS

In the Office Action dated January 14, 2004 ("the Office Action"), the claims stand rejected under 35 U.S.C. § 103(a). Applicants respectfully request consideration of the following remarks and arguments, withdrawal of the rejections, and allowance of the claims.

Status of the Claims

Claims 1-7, 13, 14, 18-20 and 24 and 28 have been previously canceled.

Claims 15 and 25 have been amended.

Claims 8-12, 15-17, 21-23 and 25-27 are currently pending.

Drawings

As requested by the Examiner, the corrected Figure 2 is re-submitted herewith. Please note that this figure, together with the annotated copy showing changes, is already of record in the PTO's image file wrapper relating to this matter.

On the date of this Response, the PTO's scanned images of the replacement drawing sheet containing corrected Figure 2, and the annotated copy, are with the PTO's scanned images of the attachments to the *Declaration of Alfred E. Keller*, submitted with the Amendment and Response to Office Action of June 30, 2003 (PTO mailroom date August 28, 2003). Those attachments are indexed in the PTO's image file wrapper as an August 28, 2003 submission under the Document Description "Affidavit(s) (Rule 131 or 132) or Exhibit(s) Received."

Rejections Under 35 U.S.C. § 103(a)

In the Office Action dated June 30, 2003, claims 8, 9, 11, 12, 15, 17, 21-23 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *DeJong et al.* (5,720,901) in view of *Kiliany et al.* (5,512,260). While acknowledging that *DeJong et al.* fails to specify a sulfur condenser, the Office Action nevertheless alleges that it would have been obvious to one of ordinary skill in the art at the time Applicants' invention was made to have implemented the sulfur condenser of *Kiliany et al.* for the sulfur removal unit in *DeJong et al.*, allegedly since it is merely the selection of a means known to the art for the removal of sulfur from a gas stream. In Item 5 of the Office Action it is alleged that "*DeJong et al.* discloses that any suitable technique for use in the desulfurization unit for removing sulfur from a gaseous stream known to the art can be used, but fails to specify a sulfur condenser." In response to Applicant's prior argument, a similar assertion is made in Item 9 of the Office Action of January 14, 2004,

While there may be some differences in the two references, DeJong et al. discloses that any suitable technique for use in the desulfurization unit for removing sulfur from a gaseous stream known to the art can be used, but fails to specify a sulfur condenser. Kiliany et al. teaches a sulfur condenser for the purpose of removing sulfur from the product gas of an oxidation reactor (col. 4, lines 24-33), and one would look toward the Kiliany reference as it teaches a means known to the art for the removal of sulfur from a gas stream as required by DeJong et al. [underlining and boldface added]

Those assertions in the Office Action indicate a misreading and misinterpretation of the *DeJong et al.* reference, however. It is important to consider the exact words of *DeJong et al.* at col. 8, lines 21-27, which are as follows:

Suitable processes for use in the desulfurization unit for removing sulfur-containing components from the carbon monoxide/hydrogen product are well known in the art. Suitable techniques include adsorption of the sulfur-containing compounds by passing the product stream through a bed of a suitable adsorbent, for example active carbon or zinc oxide. [underlining added]

All Sulfur-containing Gases are Not Treated the Same Way

A suitable process for removing sulfur-containing components from a carbon monoxide/hydrogen product (syngas) feed to sulfur-sensitive applications (col. 8, lines 21-27 of *DeJong et al.*) is not necessarily the same as a suitable process for use in a sulfur-recovery operation such as cleaning up tail gases from Claus plants (Figure 1C; col. 4, lines 63-65 of *Kiliany et al.*). Historically, a variety of techniques have been employed for removal of sulfur-containing components from carbon monoxide/hydrogen product (*i.e.*, synthesis gas or "syngas"). At the time of the present invention, a sulfur condenser, as employed by *Kiliany et al.*, was not among the techniques conventionally employed for cleaning up synthesis gas. U.S. Patent No. 6,103,206 ("the '206 patent"), attached hereto, is representative of a body of literature that supports this point. For example, at col. 1, lines 45-47 and col. 5, lines 25-40, the conventional practice of desulfurizing the hydrocarbon feed to syngas generation units in order to remove all but trace amounts of sulfur-containing contaminants are described. At col. 1, line 64 - col. 2, line 4, conventional methods for reducing sulfur containing compounds, sometimes referred to simply as "sulfur" removal (col. 2, lines 35-37), in the syngas product are described.

H₂S Not Necessarily Converted to S⁰ in DeJong et al.

At col. 5, lines 40-47, the attached '206 patent states,

In the FBSG [fluid bed syngas generating unit] or other syngas generator or unit, the sulfur compounds remaining in the gas are converted to H₂S. Further, since each mole of natural gas makes about three moles of syngas, the sulfur concentration in the syngas product will be about 1/3 that of the natural gas and, as set forth above, contacting the sulfur containing syngas with zinc oxide will reduce the total sulfur to less than 10 vppb and preferably less than 5 vppb. [underlining added]

and at col. 6, lines 55-61,

...[the syngas is] passed into a sulfur absorption zone via line 82, in which it contacts a gas porous bed of particulate zinc oxide 84 in guard bed vessel 86. ... The syngas entering bed 84 has a sulfur content typically ranging from about 10-100 ppb and preferably no more than 50 ppb, which is all H₂S. [underlining added]

Also attached hereto, in support of Applicant's position that elemental sulfur would not necessarily be produced in the process of *DeJong et al.*, is a copy of U.S. Patent No. 4,844,837 ("the '837 patent") which states at col. 4, lines 45-49,

The effluent gas from the catalytic partial oxidation zone contains primarily CO, H₂, H₂O, N₂, C₂ to C₄ and other lighter hydrocarbons, including olefins, and, depending upon the sulfur content of the feed stock, H₂S and COS.

Applicant respectfully submits that the position taken in the Office Action is inconsistent with conventional practice at the time of Applicant's invention, as exemplified by the '206 and '837 patents. Since the '206 patent teaches that during syngas production the sulfur compounds are converted to H₂S and the sulfur component of the syngas product is all in the form of H₂S, it is not reasonable for the Office to take a contrary position that elemental sulfur is necessarily or inevitably produced in the process of *DeJong et al.*, much less that a sulfur condenser could be practically employed.

DeJong et al. does not teach or suggest that elemental sulfur is produced when one or more of the named sulfur-containing compounds are present in the feed to the syngas generation reactor. *DeJong et al.* teaches the necessity of operating the syngas generation process at "elevated temperatures" (col. 5, lines 45-46), exemplified by the preferred range of 950°C - 1,300°C (col. 5, lines 49-51). By contrast, in the process of *Heisel et al.* it is emphasized that above about 300°C the undesirable combustion of H₂S to SO₂ occurs. The *Kiliany et al.* patent teaches direct oxidation of H₂S at temperatures between about 150°C and about 350°C (col. 6, lines 62-64). The '206 patent

teaches that sulfur compounds remaining in the natural gas feed are converted to H₂S in the fluid bed syngas generator (FBSG) or other syngas generator or unit. From the teachings of the '206 patent, the *Heisel et al.* patent and the *Kiliany et al.* patent, the skilled practitioner could have reasonably concluded at the time of Applicant's invention that, if any H₂S were included in the feed to the apparatus of *DeJong et al.*, the sulfur component would likely emerge from reactor 2 and line 16 as H₂S and/or as the complete combustion product SO₂.

Teaching Away in *DeJong et al.*

Additionally, *DeJong et al.* implicitly teaches away from the existence of a condensable concentration of elemental sulfur vapor in the synthesis gas product exiting process line (18). At col. 8, lines 13-16 of *DeJong et al.* it is said that product gases requiring no desulfurization can go directly to another process unit without further treatment. The skilled artisan would recognize that if a condensable amount of elemental sulfur vapor were present in the gas exiting process line (18) of *DeJong et al.*, the elemental sulfur could "freeze" out of the gas and deposit in the pipes, vessels and compressors of the downstream application, eventually causing the downstream process flow to be substantially curtailed. The attached copy of the paper "The Lost Cabin Gas Plant Expansion - a Unique Challenge" presented at the Laurance Reid Gas Conditioning Conference, Feb. 27 - Mar. 1, 2000 in Norman, OK (proceedings published by the University of Oklahoma, Oklahoma City, OK), describes the general problem of sulfur deposition in pipes and vessels. Since one of ordinary skill in the art would reasonably avoid such occurrences, the skilled artisan could reasonably conclude that the synthesis gas product in process line (18) of *DeJong et al.* does not contain an amount of elemental sulfur that could deposit on downstream apparatus, or which could be practically removed by a conventional sulfur condenser.

In the comments responsive to Applicant's prior arguments, the Office Action of January 14, 2004 relies on the statement in *DeJong et al.* that the hydrocarbon feedstocks used directly from naturally occurring reservoirs in which the sulfur content is significantly above the preferred 100 ppm upper limit can be used (col. 5, lines 26-31). Applicant respectfully submits that *DeJong et al.* does not provide any guidance, however, as to what "significantly above" 100 ppm is, or what "in a sufficient concentration to reduce the formation of ammonia and hydrogen cyanide" means in terms of H₂S concentration (col. 5, lines 17-19). There is insufficient teaching in *DeJong et al.* to determine at what concentration of sulfur-containing compound(s) the customary initial desulfurization of the hydrocarbon feed to the syngas reactor is necessitated. Moreover, the

conventional practices described above and the teaching away in the literature from allowing more than a few ppm of H₂S (e.g., 1-10 vppm according to the '206 patent) to remain in the feed to a syngas generator argue strongly against a concentration of sulfur-containing compound(s) in the hydrocarbon feed to the process of *DeJong et al.* that goes far beyond the exemplary 100 ppm limit.

For at least the foregoing reasons, Applicant respectfully submits that there would have been no reasonable basis for one of ordinary skill in the art at the time Applicant's invention was made to assume that elemental sulfur would necessarily exist in the synthesis gas product of *DeJong et al.*

Conventional Syngas Cleanup Techniques

Also submitted herewith in support of these remarks is a copy of U.S. Patent No. 6,682,711 ("the '711 patent"), which describes well known syngas cleanup techniques at col. 1, lines 32-38,

Techniques for removing sulfur from syngas before Fischer-Tropsch synthesis are well known. They typically involve using a caustic solution (typically an amine) and adsorption on a support (typically a metal oxide), for example, zinc oxide. Examples of these techniques are described, for example, in U.S. Pat. Nos. 4,088,735 and 3,941,820.

Similar to the teachings of the '206 patent, the bulk of any sulfur-containing contaminants in a light hydrocarbon feedstock to a synthesis gas generation unit are customarily removed before syngas generation so that only minor amounts of sulfur-containing components appear in the synthesis gas product. At col. 4, line 62 - col. 5, line 18 the '711 patent describes usual methods for bulk removal of sulfur-containing components before the syngas generation step. Sulfur absorption techniques are usually employed for directly treating carbon monoxide/hydrogen (syngas) product. For example, sulfur absorption is usually employed in a Fischer-Tropsch guard bed (col. 2, lines 60-64). Although the '711 patent is not prior to the present invention, it is submitted for its clear explanation of established techniques for desulfurizing synthesis gas feeds for a Fischer-Tropsch process, and for its discussion of the problem of sulfur poisoning of catalysts (col. 1, line 32 - col. 2, line 2; col. 8, lines 42-49). The background discussion of the '711 patent states that essentially sulfur-free synthesis gas feeds are needed for satisfactory operation of Fischer-Tropsch processes, and specifically mentions sulfur levels of 10 wppb or less (col. 1, lines 20-27). Known techniques for removing sulfur from syngas are described (col. 1, lines 32-38).

The process employed in desulfurization unit (22) of *DeJong et al.* (col. 8, lines 21-27) appears to be consistent with conventional absorption or adsorption processes for cleaning up synthesis gas product, as described in the '206 and '711 patents, for example. Thus, it is submitted

that one of ordinary skill in the art at the time Applicant's invention was made would not consider the use of a bulk sulfur removal technique such as sulfur condensation using a conventional sulfur condenser to be a suitable process for desulfurization unit (22) to remove sulfur-containing components from the carbon monoxide/hydrogen product of *DeJong et al.*

Nature of the Problem to be Solved is Different in the Cited References

In its customary and usual operation, the same desulfurization unit (22) employed in the apparatus of *DeJong et al.* appears to be taught for removing each of the organic or inorganic sulfur-containing compounds that might be employed in the process of *DeJong et al.* (col. 5, lines 5-10). Compounds specifically mentioned include hydrogen sulfide, carbonyl sulfide, carbon disulfide, thiophenes, mercaptans and sulfides. The *Kiliany et al.* reference does not teach or suggest that a sulfur condenser could remove any of those compounds, much less remove them to the extent required by *DeJong et al.* in order to provide a useful synthesis gas that is suitable for feeding to a Fischer-Tropsch process. The '206 and '711 patents discussed above describe sulfur vppb levels in conventional Fischer-Tropsch feeds.

In marked contrast to the apparatus and process of *DeJong et al.*, the gas emerging from condenser (76) of the apparatus of *Kiliany et al.* appears to be ultimately incinerated in catalytic incinerator (80) (Fig. 1C; col. 4, lines 56-58 of *Kiliany et al.*). Thus, the nature of the particular problem to be solved in *DeJong et al.* (obtaining useful synthesis gas) is different than that of *Kiliany et al.* (removal of sulfur from low H₂S content gas streams), and one of ordinary skill in the art would not be motivated to look to the teachings of *Kiliany et al.* when endeavoring to construct an apparatus for generating synthesis gas, especially when very low sulfur synthesis gas feeds for sulfur sensitive applications are sought to be produced. Lack of motivation to combine is discussed further in subsequent remarks.

A Sulfur Condenser Is Not a Substitute for Desulfurization Unit (22)

As pointed out above, in its normal operation the apparatus of *DeJong et al.* appears to employ desulfurization unit (22) to remove any of the other sulfur-containing compounds, including H₂S. Clearly, such broad applicability for removing various sulfur-containing compounds could not have been reasonably expected of a sulfur condenser. For example, *Heisel et al.* states at col. 5, lines 48-52,

The tail gas which is extracted from the sulfur condenser installed downstream of the reactor for the catalytic direct oxidation still contains small amounts of sulfur compounds. The tail gas is therefore preferably injected into an afterburner.

This teaching of *Heisel et al.* is consistent with the explanation in the *Declaration of Alfred E. Keller* that it would not have been practical to employ a sulfur condenser to try to produce the "substantially sulfur-free product stream" required by *DeJong et al.* for the desulfurized syngas product exiting desulfurization unit (22). This impracticality is evidenced by the physical/chemical properties of sulfur vapor and the practical limitations of conventional sulfur condensers using boiling water as a cooling medium (see paragraph 10 of the *Declaration of Alfred E. Keller*). Not only would it have been impractical for one of ordinary skill in the art at the time of Applicant's invention to try to design a sulfur condenser that could produce the requisite low levels required of feed 24 in *DeJong et al.* for a conventional Fischer-Tropsch process (col. 3, lines 42-47; col. 8, lines 17-20), it would also have gone against the accepted practices and conventional thinking in the art of synthesis gas production at the time of the invention.

As exemplified by the '206 patent, the conventional procedure in the field of synthesis gas generation at the relevant time was to carry out an initial desulfurization of a natural gas feed containing more than about 10 vppm (about 0.001 vol.%) H_2S or other sulfur-containing compound. In support of this position, attached is an excerpt from the published proceedings of the National Petroleum Refiners Association (NPRA), Question and Answer Session on Refining and Petrochemical Technology, held in October, 1993 in Dallas, Texas (published by Gerald L. Farrar & Assocs., Tulsa OK), which includes discussion of customary practices of initially desulfurizing feeds to H_2 production plants. Synthesis gas is a mixture of H_2 and CO .

The '206 patent describes (at col. 5, line 67 - col. 6, line 20) a process in which a natural gas feed containing about 2 vol.% sulfur-containing components (mostly H_2S) is desulfurized by amine scrubbing and molecular sieves, to reduce the sulfur content to about 4 - 10 vppm. One or more sulfur-absorption bed might follow to further reduce the sulfur content before the natural gas contacts the syngas generation catalyst. (See col. 5, lines 28 - 47 and col. 6, lines 2-14 of the '206 patent.) Thus, one of ordinary skill in the art at the time Applicant's invention was made would consider the routine introduction of more than about 10 vppm H_2S impractical, especially if a catalytic metal known to be sensitive to sulfur compounds were used in the syngas generator. Consequently, the skilled practitioner would not consider it practical or useful to substitute a conventional sulfur condenser for desulfurization unit (22) in the apparatus of *DeJong et al.* as a way to remove any of the sulfur-containing compounds mentioned in *DeJong et al.*, much less as a way to

achieve the requisite low level of sulfur content. The '206 patent and the *DeJong et al.* patent both note the serious consequences of sulfur poisoning of syngas generation catalysts.

No Teaching or Suggestion to Modify the Apparatus of *DeJong et al.*

None of the cited references teach or suggest modifying the apparatus shown in Figure 1 and described at col. 7, line 65 - col. 8, line 21 of *DeJong et al.*, much less varying the apparatus according to the particular sulfur-containing compound(s) chosen for reducing the amounts of ammonia and hydrogen cyanide in the synthesis gas product (col. 5, lines 1-6). The same apparatus appears to be employed no matter which of the mentioned sulfur-containing compounds, or combinations thereof, are included in the feed to the reactor of *DeJong et al.* The exemplary process in *DeJong et al.* utilizes tetrahydrothiophene as the sulfur-containing compound in the feed. Applicant respectfully submits that, in the normal operation of the process and apparatus of *DeJong et al.*, in which the chosen sulfur-containing compound is any of the organic or inorganic compounds mentioned at col. 5, lines 5-10, there would be no reasonable expectation that a sulfur condenser could successfully remove such compounds from the synthesis gas product. Therefore, it would be pointless to modify the apparatus of *DeJong et al.* by substituting the sulfur condenser of *Kiliany et al.* for desulfurization unit (22), as suggested in the Office Action, absent the certainty that a condensable amount of elemental sulfur vapor would be present in the synthesis gas product of *DeJong et al.*

For at least the foregoing reasons, Applicant respectfully submits that the Office Action has not established a *prima facie* case of obviousness with respect to any of the pending claims.

Claims 8, 9, 11 and 12.

It is said in the Office Action of January 14, 2004 with respect to claim 8 that the sulfur condenser of *Kiliany et al.* may be implemented for the desulfurization unit (22) of *DeJong et al.* to provide the claimed invention. Applicant has established in the foregoing discussions, however, that as a practical matter, a sulfur condenser could not perform the requisite function of desulfurization unit (22), and that one of ordinary skill in the art would not be motivated to modify the apparatus of *DeJong et al.* as suggested in the Office Action. Claims 9, 11 and 12 depend directly or indirectly from claim 8 and are believed to distinguish over the combined references for at least the same reason as claim 8.

Claims 15 and 25.

For better consistency of terminology, Applicant has amended claims 15 and 25 to match the language of the specification at page 6, line 27 (*i.e.*, "tailgas converter unit") instead of "tailgas processing unit." Claim 15 has also been amended to recite that the tailgas converter unit is "for removing residual sulfur from the product." In rejecting claim 15, it is alleged in the Office Action that *DeJong et al.* teaches that "the tailgas (sulfur-free product stream) can be processed (supplied to sulfur-sensitive applications) downstream of the sulfur removal (col. 8, lines 11-20)." Applicant respectfully submits that *DeJong et al.* does not teach or suggest a tail gas treatment unit downstream from desulfurization unit 22 that removes residual sulfur from the syngas product stream. Clearly, a sulfur-free product stream supplied to sulfur-sensitive applications, as in *DeJong et al.*, is not the same thing as an apparatus comprising a tailgas converter unit for removing residual elemental sulfur downstream of the sulfur condenser, as in currently amended claims 15 and 25. With respect to claim 25, even if the *DeJong et al.* patent teaches the use of a similar sulfur absorbing material in its desulfurization unit (22), that still does not constitute a teaching or suggestion to place such a desulfurization unit in line following a sulfur condenser.

Claim 17.

With respect to claim 17, the Office Action states that the *DeJong et al.* reference discloses wherein the catalyst used contains rhodium, palladium, iridium or platinum. Applicant submits that even if the syngas generation apparatus of *DeJong et al.* were to employ a catalyst metal that is recited in claim 17, this would still not amount to the same apparatus as claim 17 for at least the reasons discussed above with respect to claim 8. There would be no motivation to modify the apparatus of *DeJong et al.* with the sulfur condenser of *Kiliany et al.* in the manner suggested in the Office Action.

Claim 21.

It is said in the Office Action that the modified apparatus of *DeJong et al.* provides all of the limitations of claim 21 except for a boiler and a heater. *Kiliany et al.* is relied upon as allegedly teaching "the use of a boiler (63) for the gases from a reactor in order to generate a process stream which is 'very useful' with waste heat," referring to col. 5, line 55 - col. 6, line 2 of *Kiliany et al.* Applicant submits that, to the contrary, the waste heat boiler (63) of *Kiliany et al.* is used to cool the process gas from a hydrogenation reactor and at the same time produce useful steam. The proposed

modification of *DeJong et al.* would be opposite to the heater of claim 21 which receives and heats the gases emerging from the sulfur condenser.

The Office Action further alleges that *Kiliany et al.* teaches a tailgas processing unit which uses the gas from a condenser to a heater (81) and then to a tailgas clean-up unit (80). Applicant submits that tailgas clean-up unit 80 in *Kiliany et al.* is a catalytic incinerator, as taught at col. 6, lines 53-56, whereas the tailgas clean-up unit of Applicant's claim 21 is not. See Applicant's specification at page 10, lines 15-21 for support. If the tailgas cleanup unit of *Kiliany et al.* were employed in the apparatus of *DeJong et al.*, the synthesis gas would be incinerated rather than being cleaned of residual sulfur-containing components and made useful for sulfur-sensitive downstream applications. All of the limitations of claim 21 are not provided by combining the cited references as suggested in the Office Action.

Claim 22.

The teachings of *Kiliany et al.* at col. 6, lines 2-5 are relied on for combining a cooler (64) and a quench tower (65) with the modified apparatus of *DeJong et al.* It is said that it would have been obvious to have provided a cooler for receiving gas from the tail gas unit, and a quench tower in the apparatus of *DeJong et al.* in order to cool and quench the tail gas product as taught by *Kiliany et al.* Applicant submits that the cooler and quench tower referred to in *Kiliany et al.* are part of the hydrogenation stage of the Claus tail gas treatment apparatus, and thus are not employed as part of the direct oxidation stage. The particular problem to be solved in *DeJong et al.* is different than that of *Kiliany et al.* Thus, one of ordinary skill in the art at the time Applicant's invention was made would not be motivated to take equipment from the hydrogenation apparatus of *Kiliany et al.*, in which H₂S is generated, when endeavoring to construct a catalytic partial oxidation apparatus for the purpose of producing synthesis gas containing reduced amounts of ammonia and cyanide, because of the different purposes of the references. Claim 22 depends indirectly from claim 8 and is also patentable over the cited references for the same reasons as claim 8.

Claim 23.

Claim 23 is rejected under 35 U.S.C. § 103(a) on the grounds that a catalyst of *DeJong et al.* is capable of catalyzing the claimed reactions. Applicants submit that even if a rhodium catalyst were employed in the process of *DeJong et al.*, without the benefit of Applicant's disclosure one would not know how to establish process conditions that would ensure that both reactions would take place and that recoverable elemental sulfur would be produced. Applicant has explained in the

foregoing arguments that there would have been insufficient motivation for combining the condenser of *Kiliany et al.* with the apparatus of *DeJong et al.* for at least the reason that the artisan would not have concluded that elemental sulfur would necessarily be produced during the normal operation of the apparatus as disclosed in *DeJong et al.* Moreover, since claim 23 depends from claim 8 it is also patentable over the cited references for the same reasons as claim 8.

Claim 10.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of *DeJong et al.* and *Kiliany et al.* as suggested in the Office Action with respect to claim 8, in view of *Dubois et al.* Applicant submits that even if a thermal barrier were taught by *Dubois et al.* similar to that of Applicant's claim 10, without conceding that such is the case, there would still be insufficient motivation to modify the apparatus of *DeJong et al.* in the manner suggested in the Office Action with respect to claim 8. Claim 10, which depends indirectly from claim 8, is believed to be free of the combined references for at least the same reasons as claim 8.

Claim 12.

Claim 12, which depends indirectly from claim 8, is patentable for at least the same reasons as discussed above with respect to claim 8. Even if *Dubois et al.* did teach a mixing zone and an oxygen line similar to that of claim 12, without admitting that such is the case, such teachings by *Dubois et al.* would not correct any of the failings in the teachings of *DeJong et al.* and *Kiliany et al.* which are discussed elsewhere in these Remarks.

Claim 16.

Claim 16, which depends from claim 8, stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of *DeJong et al.* and *Kiliany et al.* as suggested in the Office Action with respect to claim 8, in view of *Goetsch et al.* Without conceding that such is the case, even if a wire gauze catalyst support similar to that of claim 8 were taught by *Goetsch et al.*, that would not correct the failings in the teachings of *DeJong et al.* and *Kiliany et al.*, as discussed above with respect to claim 8. Since there would have been insufficient motivation to modify the apparatus of *DeJong et al.* with the sulfur condenser of *Kiliany et al.*, claim 16 is patentable over the cited references for at least the same reasons as claim 8.

Claims 26 and 27.

Claims 26 and 27 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of *DeJong et al.* and *Heisel et al.* In the Office Action of January 14, 2004 it is

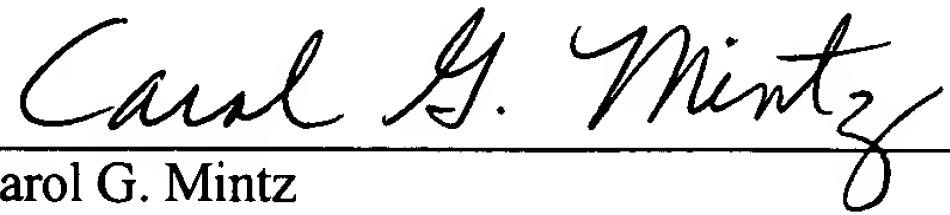
acknowledged that *DeJong et al.* is silent to a means for recovering condensed elemental sulfur, yet it is alleged that any suitable technique for use in the desulfurization unit for removing sulfur from a gaseous stream known to the art can be used as a means for removing sulfur from gas. It is said that *Heisel et al.* teaches a sulfur condenser means for recovering elemental sulfur for the purpose of having useful sulfur at the end of the process. As discussed elsewhere in these Remarks, *Heisel et al.* expressly states that the tail gases emerging from the sulfur condenser still contains small amounts of sulfur compounds (col. 5, lines 48-50). Accordingly, there is no reasonable basis for concluding that one of ordinary skill in the art at the time Applicant's invention would be motivated to substitute the sulfur condenser of *Heisel et al.* for the desulfurization means disclosed by *DeJong et al.*, which must be capable of providing a synthesis gas that is sufficiently free of sulfur-containing components to be acceptable as a feed to a conventional Fischer-Tropsch process. The '206 patent teaches that the syngas feed to a Fischer-Tropsch process should contain less than 0.1 vppb total sulfur (col. 2, lines 9-11). The problem to be solved by *Heisel et al.* is different than the particular problem of *DeJong et al.*, which endeavors to remove various sulfur-containing compounds from a synthesis gas product. Thus, one of ordinary skill in the art at the time Applicant's invention was made would have insufficient motivation to try to modify the apparatus of *DeJong et al.* with apparatus from *Heisel et al.* for substantially the same reasons as set forth above with respect to *Kiliany et al.*

Conclusion

Applicants may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. Moreover, it should be understood that there may be other arguments with respect to patentability which have yet to be raised, but which may be raised in the future.

All of the pending claims are believed to be free of the cited references, and reconsideration and withdrawal of the rejections are respectfully requested. If a telephone conference would facilitate the resolution of this matter, the Examiner is invited to telephone the undersigned representative. Should any fees have been inadvertently omitted, or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Deposit Account Number 03-2769 of Conley Rose, P.C., Houston, Texas, and consider this a petition for any necessary extension of time.

Respectfully submitted,



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**RE-SUBMITTED corrected Figure 2
(annotated sheet and replacement sheet)**

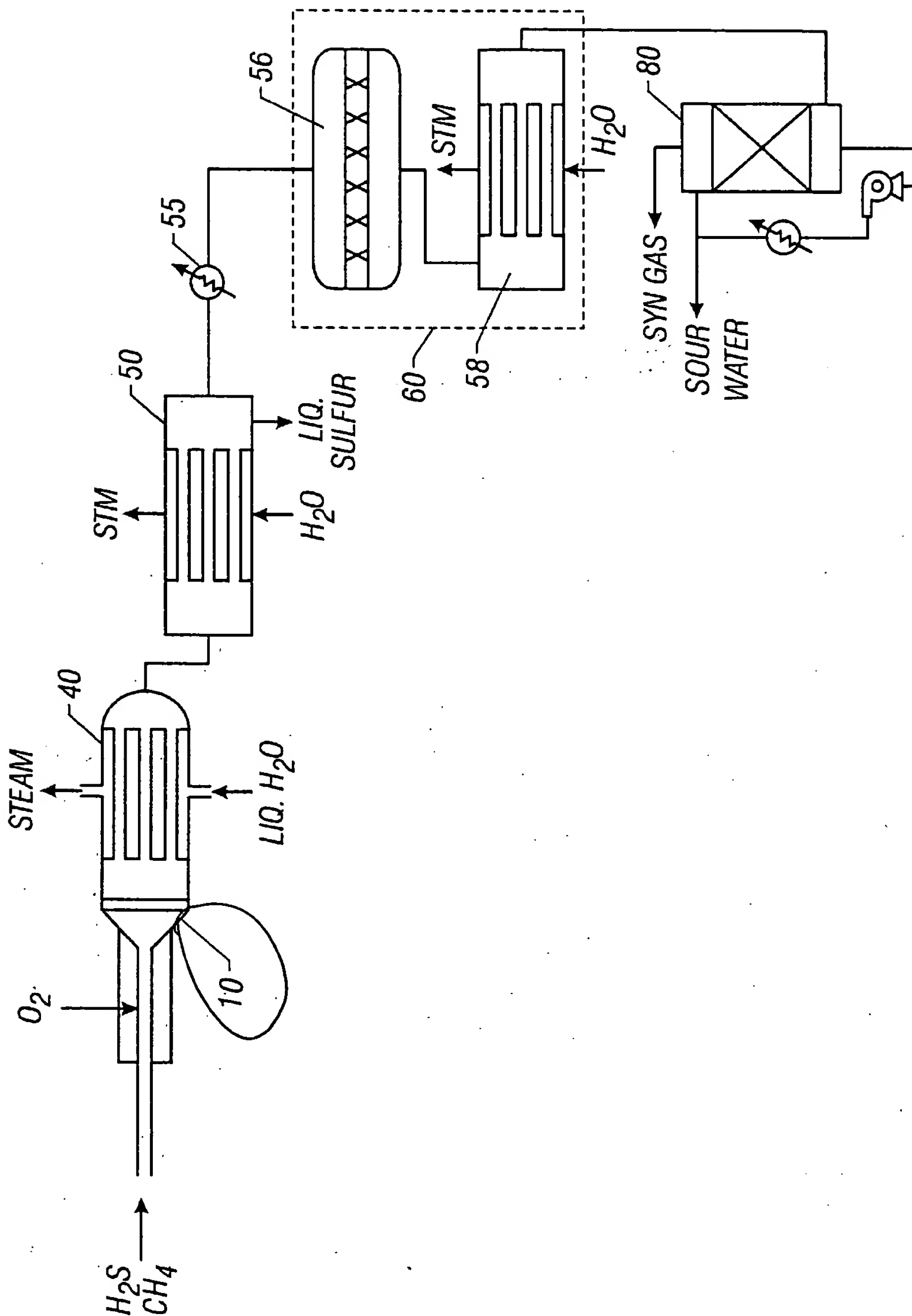


FIG. 2